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Stability of surface states of general weak Z2 topological insulators and superconductors TAKAHIRO MORIMOTO, RIKEN, AKIRA FURUSAKI, RIKEN CEMS — A three-dimensional weak topological insulator (TI) is adiabatically connected to stacked layers of two-dimensional strong topological insulators and typically possesses two surface Dirac cones that can be gapped out without breaking the time-reversal symmetry. Unexpected strength of weak TIs has been pointed out by recent theoretical studies, showing that the surface Dirac fermions of weak TIs are not localized when the mean of the random potential is zero, as a consequence of the uniqueness of the dimerization mass term gapping out the surface Dirac cones. Motivated by these, we study the surface stability of weak Z_2 topological insulators and superconductors (TIs/TSCs) in the general Altland-Zirnbauer symmetry classes, considering representative Dirac Hamiltonians in various spatial dimensions. We show that we can always find a unique Dirac mass term that dimerizes stacked layers and gaps out surface Dirac fermions. The two dimerized gapped phases with different signs of the mass are distinguished by a Z_2 index. If we impose spatial uniformity of the randomness of the surface on average, then the gapless surface states are not localized because they are connected with the quantum critical point between the two Z_2-distinct dimerized phases.

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